The TWG is the central forum for stakeholder input and recommendations to DEQ in their development and implementation planning, I would like to offer comment on the technical components & data collected to date. I understand that TWG members have the opportunity to shape the process and help focus periodic revisions to the temperature TMDLs. Based on my expertise in the assessment and implementation of a wide range of water quality improvements, environmental engineering and river modeling, as well as forest-specific BMPs, I would like to offer the following comments on the Mid-Coast Temperature TMDLs.
Greg Peterson P.E. 2-21-13

Vegetative height inventory issues re; Mid-Coast temperature TMDLs

1) Recent EPA and DEQ court briefs filed for NCC (Natural Conditions Criteria) and NTP (Natural Thermal Potential), leave the temperature standard undefined. In the meantime, it is not appropriate for DEQ to continue with vegetation inventory portion of model.
2) The elements in the general TMDL equation for load allocation were developed primarily for pollutant mass loadings, such as BOD, turbidity, and nitrate, and do not fit the mechanisms that determine water temperature, which are largely based on stream hydrology, weather, vegetation, and other site-specific variables, non of which readily fits the general TMDL equation for load allocation. In all watersheds there is an inevitable cumulative temperature increase along its path from the headwaters to its receiving waters, and using a site-specific assessment, this baseline increase should first be defined for each TMDL watershed as the "natural source" allowance in the TMDL model, before an attempt is made to assign any allocation for "human use load", reserve capacity, or margin of safety. The 0.3C "human use allowance" increase now used in the TMDL model is arbitrary and independent of stream length, which is counter to normal scientific definition. The 0.3C "human use allowance" is unrealistic for the unique conditions found in Mid-Coast streams and rivers.

3) DEQ is proposing to use LIDAR imagery which is over 11 years old, which would not reflect current conditions. In addition, LIDAR imagery is taken in late fall, after leaves have fallen and rivers have risen, eliminating the effect of bank shading. LIDAR is normally used to help determine ground topography and canopy height, but does not indicate species, canopy density, or effective shading (maximized in summer. Different tree and brush species and heights provide significantly different shading. LIDAR primarily measures crown height, but multi-tier canopies normally form in riparian areas - usually in response to available sunlight, and thus the shade provided by Mid-Coast riparian vegetation occurs in more than just the crown height. Summer LIDAR imagery, ground shade surveys, or other means are needed to better define shade density. Several TWG members commented on the need to "ground truth" all LIDAR data. The proposed model input is fundamentally flawed.

4) DEQ proposes use of a 30-m riparian zone width for all stream types, as this was said to be the minimum resolution of the NLCD (National Land Cover Database) model, which is a NOAA-funded model intended to monitor land cover changes

nationwide and formulate policies related to global warming and climate change. It is far-reaching to apply the broad-scale NLCD model to the special focus needed to determine riparian zone impact on stream temperatures. It has been shown in empirical studies, like RipStream and others, that full effective shading (and temperature protection) is achieved well shy of a 30-m riparian width. DEQ needs to first use prevailing BMPs such the Oregon Forest Practices, in any modeling effort. Jumping to a 30-m width effectively abandons BMP riparian widths and tree retention criteria in the Oregon Forest Protection Laws as inadequate, and essentially starts all over with a new definition of riparian buffers. The riparian widths and tree retention criteria now in the Oregon Forest Practices Act, were developed based on a solid scientific basis, and recognize the need for different criteria for each stream type (Type F, D, and N), different regional requirements, and other factors.

5) Mid-Coast streams and rivers have features unique from those found in other regions, such as steep slopes and relatively impermeable clay soil and bedrock, naturally causing high winter peak runoff and very low summer flow. These are fundamentally different from the vegetation and hydrology of other regions and extrapolating models or findings from any other region is tenuous. Each temperature TMDL should not be assumed to be solely caused by shortcomings in the current Oregon Forest Protection Law, but needs to recognize its unique features. For example, low tree retention criteria may have causes other than poor management practices, for example, stream-side roads, shallow bedrock, poor soil types, erosion, development, less than BMP riparian criteria in non-forest areas, etc. There needs to be an assessment of upstream land use, compliance with existing law, etc before presuming that BMPs in the Oregon Forest Practices should be scrapped. For example, while the average Yachats River temperature was well within numeric (biologically based) criteria, DEQ measured slightly higher(.2 to .4 degreesC) 7-day maximum temperature at three sections (3, 7-10, & 12 km) than the 18C standard, upstream of each section is a highway next to the river and judging from the aerial photos presented at the 5-16-12 meeting, some areas have less riparian vegetation than called for in the Oregon Forest Practices. There was limited correlation of stream temperature with DEQ measurements of effective shade, and yet the river quickly cooled downstream of each section. DEQ has yet to investigated specific reasons for heating or cooling in each section, which should have been a fundamental step in model calibration. It is a stated TMDL model goal to predict temperature change and understanding real-world examples is essential. Each of these sections should be investigated for the root cause of temperature peaks and subsequent cooling, rather than assuming than inferring that the Oregon Forest Protection Laws are flawed.

6) Ryan Michie indicated that DEQ's proposed vegetative height inventory would help answer the question of identifying where there is no stream side trees or vegetation and where restoration efforts should occur - it is hardly this simple or black/white. In most places, there are many other site-specific factors to consider. Much of the data used in DEQ's model is 7 years old, and does not reflect current conditions. There

needs to be a site-by-site assessment of each TMDL temperature listing, rather than rushing to the conclusion that all are caused by inadequate riparian buffers.

7) While the USPS Potential Natural Vegetation model may be useful to define potential upland trees height in various coastal regions with Site 1 soils, it is wholly inappropriate to presume that the same180-250 ft high conifers will grow in the conditions found in associated riparian zones. Most Mid-Coast streams are under lain with shallow bedrock and poor soils, which limits real-world options for changing tree species. Most riparian areas favor deciduous trees, which have lower heights and different canopy densities (usually far more dense) than conifers. Areas with shallow bedrock, shallow groundwater, poorly drained or hydric soils will simply not support tall conifers. Even if one found a riparian site with optimum conditions for conifers, most conifers are shade intolerant, so it would be necessary to clear-cut the existing deciduous tree stand, replant, and then wait many decades to see if a better canopy develops. The Potential Natural Vegetation approach would necessitate elimination of riparian shading in the short-term and risks long-term reduction as well. Modeling riparian forests with site Potential Natural Vegetation heights along the entire length of a drainage network is also an unrealistic assumption because natural patterns of disturbance are not accounted for. Only real-world BMP riparian vegetation should be used in any model. Where there are non-forest land uses or roads in riparian zones, and these result in less than BMP riparian widths - the question needs to be asked; what BMPs apply and are they allowed a lesser standard (i.e. less riparian shading)? Would nearby forest riparian zones expected to accomplish more than an equal share of the shading, if needed, so the stream has a better chance of meeting NCC and NTP? If all riparian areas don't have to meet the same standards, is forest land expected to do more than an equal share?

8) Any riparian restoration plan needs to achieve the best bang for the buck and should recognize that there is no technical basis for uniform riparian zone width. It should be recognized that a tree canopy on the S riverbank provides the greatest stream shading, whereas E & W riverbank canopies provide less, and N riverbanks provide no shading, so not all riparian zones are equally effective in providing shade. If any changes to current Oregon forest practices are considered, they should be prioritized to maximize shade improvement and minimize the economic impact.

9) Slow moving streams, wide stream beds, shallow water depth, and high air temperatures are uncontrollable site factors that also influence Mid-Coast stream temperatures, and could have a greater bearing on temperature TMDL streams than riparian zone shade. It's not difficult to imagine a situation with a high “natural source” temperature gain, where even the most ideal riparian buffer would not be enough to meet NCC goals. These and other factors should also be evaluated for each site, rather than assume all temperature TMDL streams are solely a result of inadequate riparian zone shade.

10)At the 4-18-12 meeting, it was said that the key to an effective model is a continuous learning loop, involving; implementation, monitoring, learning, and improvement. George Brown has said that even clear-cuts recover significant shading in < 5 years. Ryan said that vegetative models need to be rerun every 5 years to monitor watershed tree growth and vegetation improvements/changes. Will there be future funds to maintain data base and rerun model? What management and regulatory changes are possible with a different model output? If there is not a continuous learning loop on each TMDL stream, then flaws in the many model assumptions being made will have no chance of being corrected.

11)Changes in riparian zone width would essentially be a "take" of private ownership and would reduce forest jobs. Will public funds be available to mitigate impacts and reimburse private landowners for such “takes”?

12)ODF is considering increasing buffer strip width for State-owned forestland, for wildlife & other reasons, and not for any stream shade improvement. Similarly, Washington adopted wider riparian widths for other reasons, not based on any scientific basis for improved stream shading. I understand that Washington & California were cited by EAP and NAOO as precedence for wider riparian zones, but neither has a scientifically valid basis.

13)The Mid-Coast 303D listings show long reaches of some streams as temperature impaired, but we know that the thermal conditions immediately upstream of a measurement actually determine stream temperatures. Many temperature TDML streams are the result of a high “natural source” stream temperatures, as well as non-forested areas with less than BMP riparian widths. Where there are non-forest land uses or roads in riparian zones, and these result in less than BMP riparian widths - the question needs to be asked; what BMPs apply and are they allowed a lesser standard (i.e. less riparian shading)? Would nearby forest riparian zones expected to accomplish more than an equal share of the shading, if needed, so the stream has a better chance of meeting NCC and NTP? If all riparian areas don't have to meet the same standards, is forest land expected to do more than an equal share? How will the 0.3C “human use allowance” be allocated between stakeholders?